

299-W11-57 (A7299) Log Data Report

Borehole Information:

Borehole: 299-W11-57 (A7299)		Site: 216-T-6 Crib			
Coordinates (WA State Plane)		GWL (ft)¹: Not deep enough		GWL Date: 1/13/2003	
North 136,673.02 m	East 567,198.32 m	Drill Date March 1951	TOC² Elevation 218.1 m	Total Depth (ft) 163	Type Cable Tool

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded steel	3.6	8 5/8	7 15/16	0.343	+3.6	94
The logging engineer measured the casing stick up using a steel tape. A caliper was used to determine the outside casing diameter. The caliper and inside casing diameter were measured using a steel tape. Measurements were rounded to the nearest 1/16 in. Casing thickness was calculated.						

Borehole Notes:

Borehole coordinates, elevation, and well construction information are from measurements by Stoller field personnel, HWIS³, and Chamness and Merz (1993). Zero reference is the top of the 8-in. casing. Top of casing is cut unevenly. A reference point survey "X" is located at the top of the casing stickup.

Logging Equipment Information:

Logging System: Gamma 2A	Type: SGLS (35%)
Calibration Date: 9/2002	Calibration Reference: GJO-2002-383-TAC
Logging Procedure: MAC-HGLP 1.6.5, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3/Repeat	4
Date	1/30/03	2/03/03	2/03/03	
Logging Engineer	Spatz	Spatz	Spatz	
Start Depth (ft)	94.0	28.0	40.0	
Finish Depth (ft)	27.0	4.0	29.0	
Count Time (sec)	200	200	200	
Live/Real	R	R	R	
Shield (Y/N)	N	N	N	
MSA Interval (ft)	1.0	1.0	1.0	
ft/min	N/A ⁴	N/A	N/A	
Pre-Verification	BA190CAB	BA191CAB	BA191CAB	
Start File	BA190000	BA191000	BA191025	
Finish File	BA190067	BA191024	BA191036	

Log Run	1	2	3/Repeat	4	
Post-Verification	BA190CAA	BA191CAA	BA191CAA		
Depth Return Error (in.)	-1.5	0	0		
Comments	Fine-gain adjustment after file BA190004.	No fine-gain adjustment.	No fine-gain adjustment.		

Logging Operation Notes:

Zero reference was top of the 8-in. casing. Logging was performed with a centralizer installed on the sonde. Pre- and post-survey verification measurements for the SGLS employed the Amersham KUT (^{40}K , ^{238}U , and ^{232}Th) verifier with serial number 082. During SGLS logging, one fine-gain adjustment was needed to maintain the 1460-keV (^{40}K) photopeak at a pre-described channel.

Analysis Notes:

Analyst:	Sobczyk	Date:	02/24/03	Reference:	GJO-HGLP 1.6.3, Rev. 0
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SGLS pre-run and post-run verification spectra were collected at the beginning and end of each day. The verification spectra were all within the control limits established on 12/05/2002, except for post-run verification spectrum BA191CAA. This spectrum was slightly above the upper control limit for the 2615-keV full-width at half-maximum value. The peak counts per second (cps) at the 609-keV, 1461-keV, and 2615-keV photopeaks on the post-run verification spectra as compared to the pre-run verification spectra for each day were between 3 percent lower and 8 percent higher at the end of the day. Examinations of spectra indicate that the detector functioned normally during all of the logging runs, and the spectra are accepted.

Log spectra for the SGLS were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Post-run verification spectra were used to determine the energy and resolution calibration for processing the data using APTEC SUPERVISOR. Concentrations were calculated in EXCEL (source file: G2AFEB03.xls), using parameters determined from analysis of recent calibration data. Zero reference was the top of the 8-in. casing. On the basis of information reported in Chamness and Merz (1993), the casing configuration was assumed to be one string of 8-in. casing to the maximum depth of the logging (94 ft). The casing correction factor was calculated assuming a casing thickness of 0.343 in. This casing thickness is based upon the field measurement. A water correction was not needed or applied to the data. Dead time corrections are required when dead time exceeds 10.5 percent. As the dead time did not exceed 10.5 percent, a dead time correction was not needed or applied.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (^{40}K , ^{238}U , and ^{232}Th), and man-made radionuclides. Plots of the repeat logs versus the original logs are included. In addition, a comparison log plot of man-made radionuclides is provided to compare the data collected in 1993 and 1995 by Westinghouse Hanford Company's Radionuclide Logging System (RLS) with SGLS data. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. These errors are discussed in the calibration report. A combination plot is also included to facilitate correlation. The ^{214}Bi peak at 609 keV was used to determine the naturally occurring ^{238}U concentrations on the combination plot rather than the ^{214}Bi peak at 1764 keV because it exhibited slightly higher net counts per second.

Results and Interpretations:

¹³⁷Cs was the only man-made radionuclide detected in this borehole. ¹³⁷Cs was detected near the ground surface (6 and 7 ft). The range of concentrations was from 0.6 pCi/g to 1.0 pCi/g, which was measured at 6 ft. ¹³⁷Cs was also detected near the MDL (0.2 pCi/g) at 30 ft.

Recognizable changes in the KUT logs occurred in this borehole. Changes of 5 pCi/g or more in apparent ⁴⁰K concentrations occur at approximately 40 ft. The increase in ⁴⁰K concentrations at about 40 ft may represent the transition from the coarse-grained sediments of the Hanford H1 to the finer grained sediments of the Hanford H2.

The plots of the repeat logs demonstrate reasonable repeatability of the SGLS data for the man-made radionuclides and natural radionuclides (662, 609, 1461, 1764, and 2614 keV). The ¹³⁷Cs concentration based on the 662-keV photopeak does not repeat at 30 ft; however, ¹³⁷Cs was detected at 31 ft during the repeat logging run. This difference is probably due to slightly different depth references for each of the logging runs.

Gross gamma logs from Fecht et al. (1977) (attached) indicate that the sediments surrounding this borehole contained only background amounts of gamma radiation from 1963 through at least 1976. The logs from 4/26/63 and 5/6/76 appear to only detect natural gamma activity. The SGLS detected low levels of ¹³⁷Cs near the ground surface and at 30 ft.

Comparison log plots of data collected in 1993 and 1995 by Westinghouse Hanford Company (WHC) and in 2003 by Stoller are included. The WHC concentration data for ¹³⁷Cs are decayed to the date of the SGLS logging event in February 2003. This comparison indicates that ¹³⁷Cs concentrations on the SGLS log near 30 ft are lower than that predicted when compared to the RLS logs.

References:

Chamness, M.A., and J.K. Merz, 1993. *Hanford Wells*, PNL-8800, Pacific Northwest Laboratory, Richland, Washington.

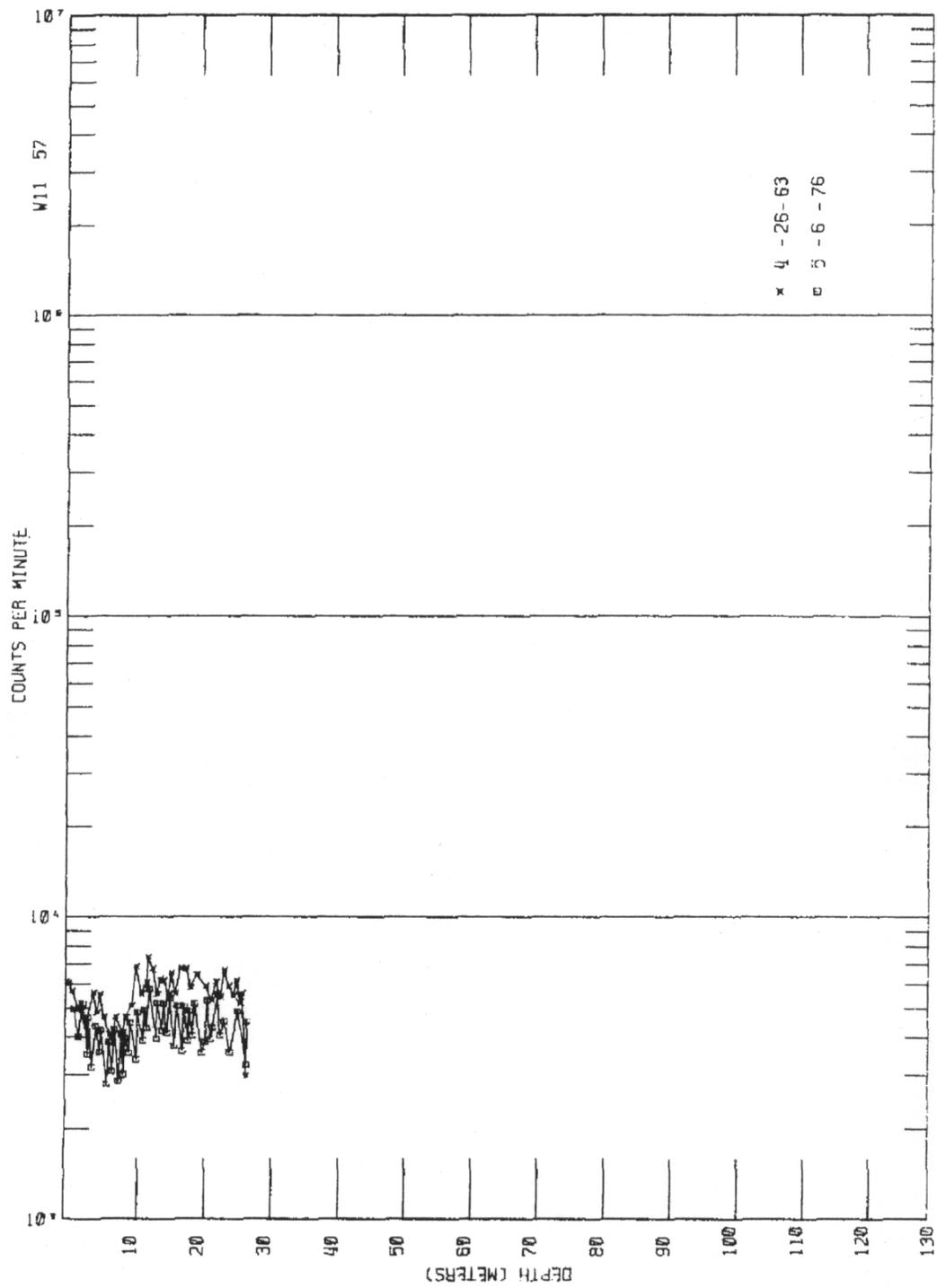
Fecht, K.R., G.V. Last, and K.R. Price, 1977. *Evaluation of Scintillation Probe Profiles from 200 Area Crib Monitoring Wells*, ARH-ST-156, Atlantic Richfield Hanford Company, Richland, Washington.

¹ GWL – groundwater depth

² TOC – top of casing

³ HWIS – Hanford Well Information System

⁴ N/A – not applicable

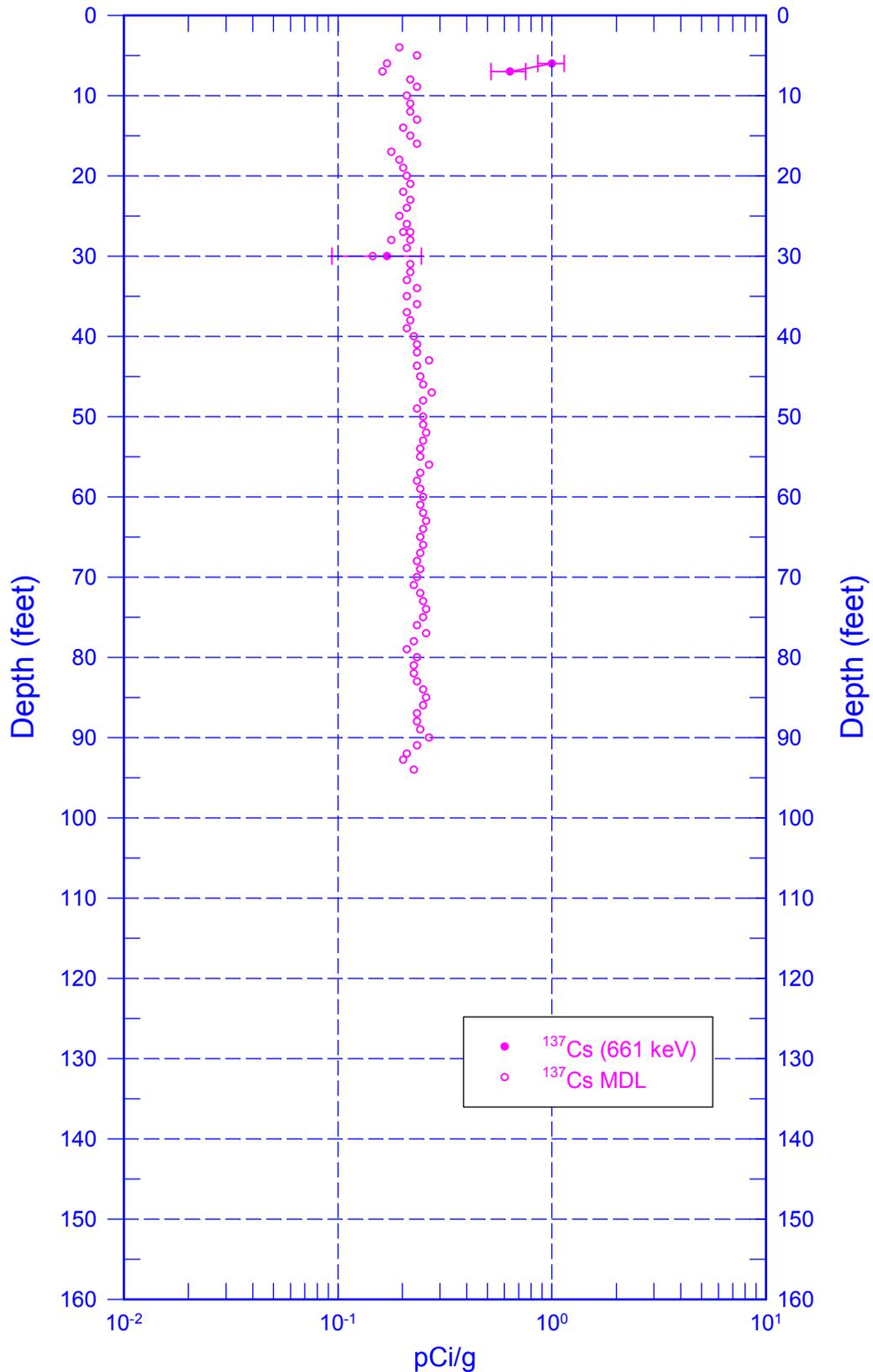


from Fecht et al. (1977)

Scintillation Probe Profiles for Borehole 299-W11-57, Logged on 4/26/63 and 5/6/76

299-W11-57 (A7299)

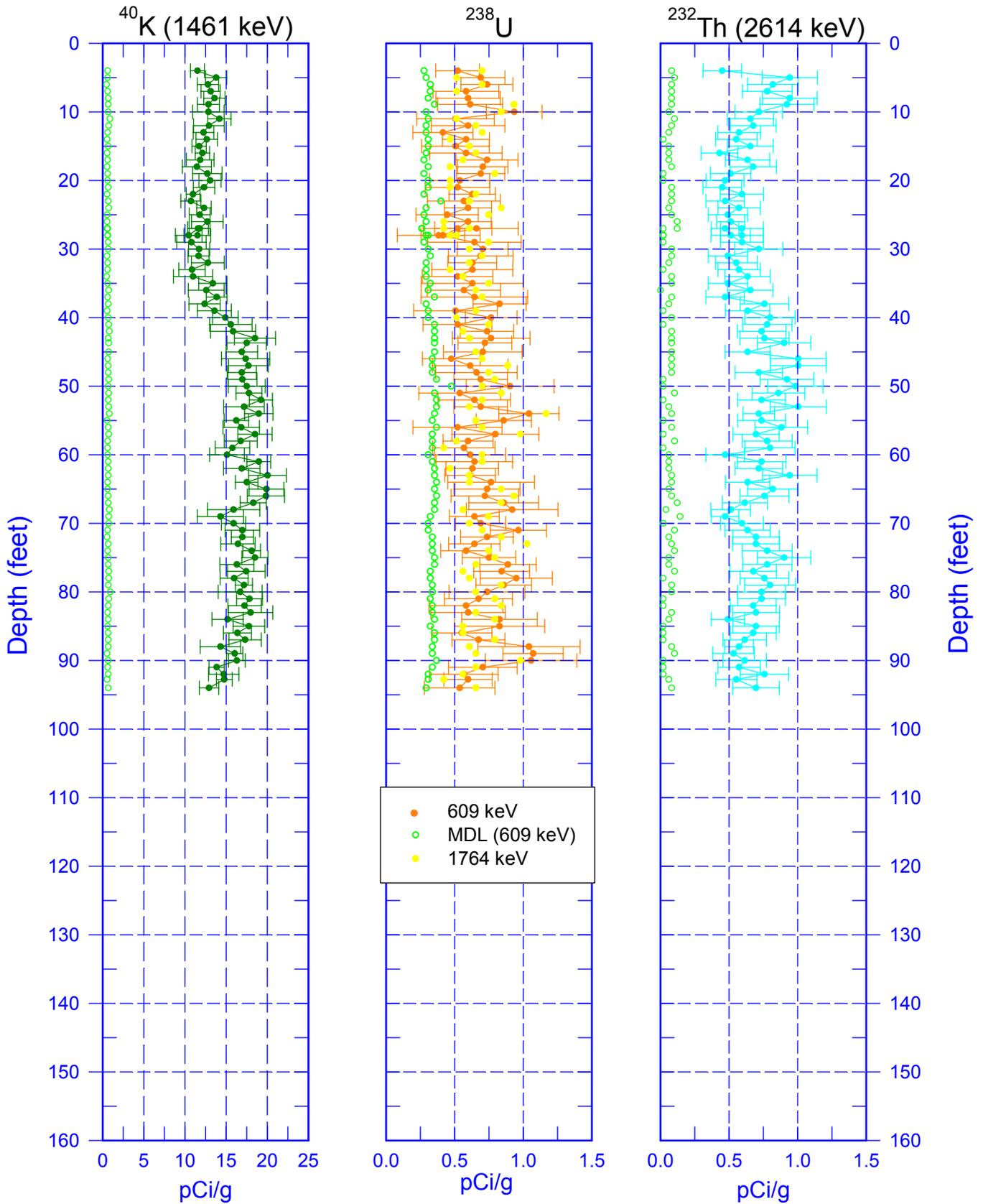
Man-Made Radionuclides



Zero Reference = Top of Casing

Date of Last Logging Run
2/03/2003

299-W11-57 (A7299) Natural Gamma Logs



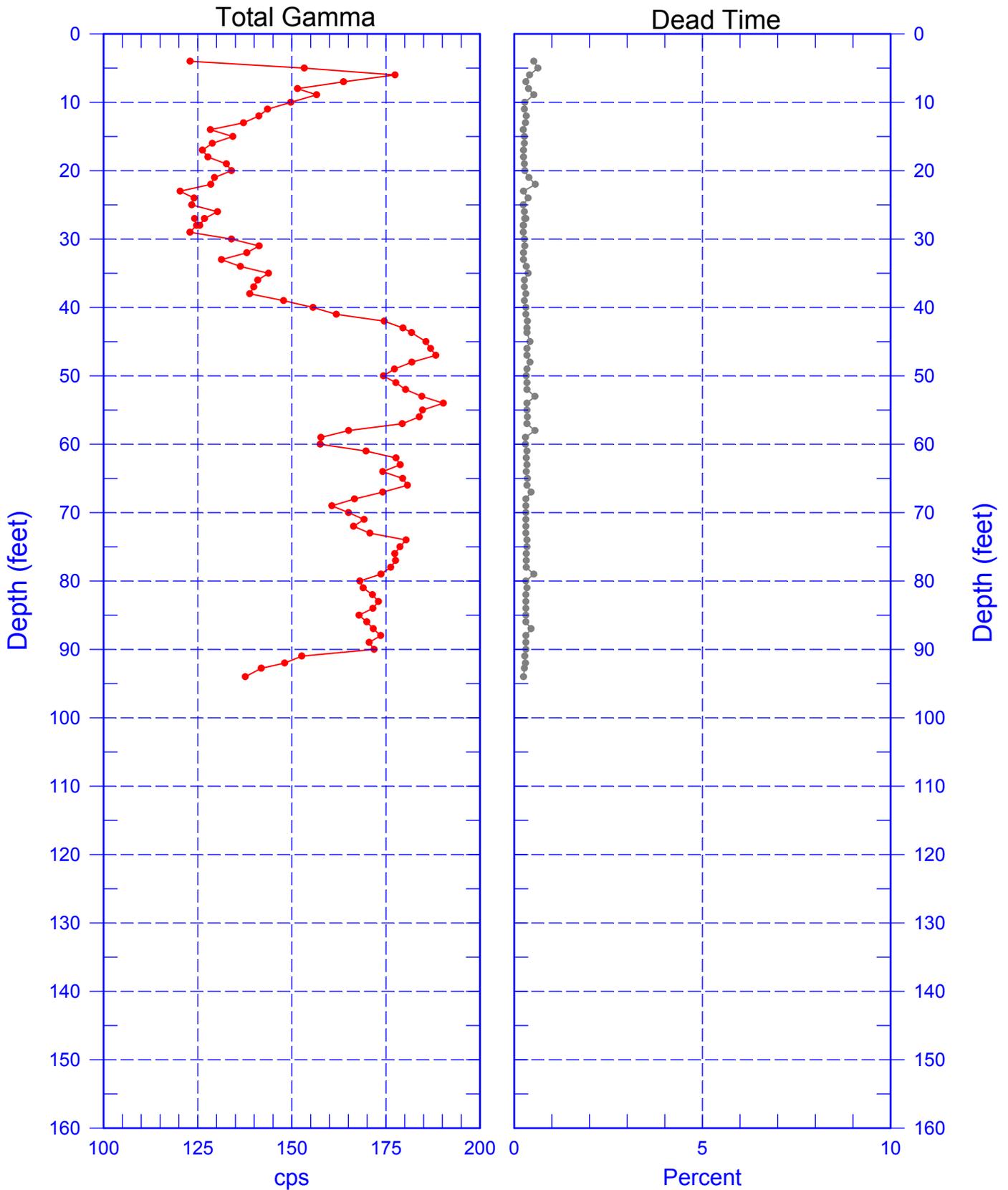
○ MDL

Zero Reference = Top of Casing

Date of Last Logging Run
2/03/2003

299-W11-57 (A7299)

Total Gamma & Dead Time

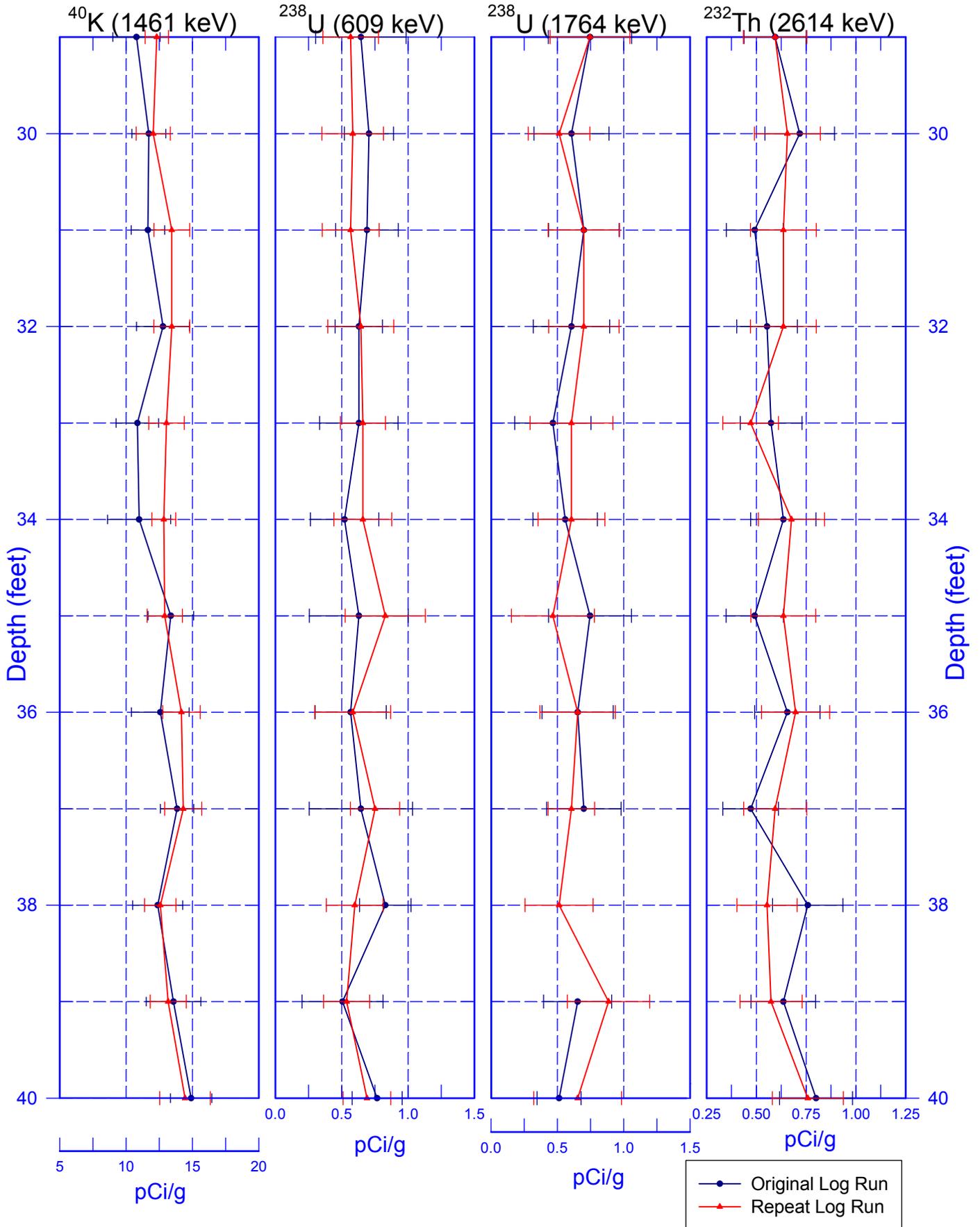


Zero Reference = Top of Casing

Date of Last Logging Run
2/03/2003

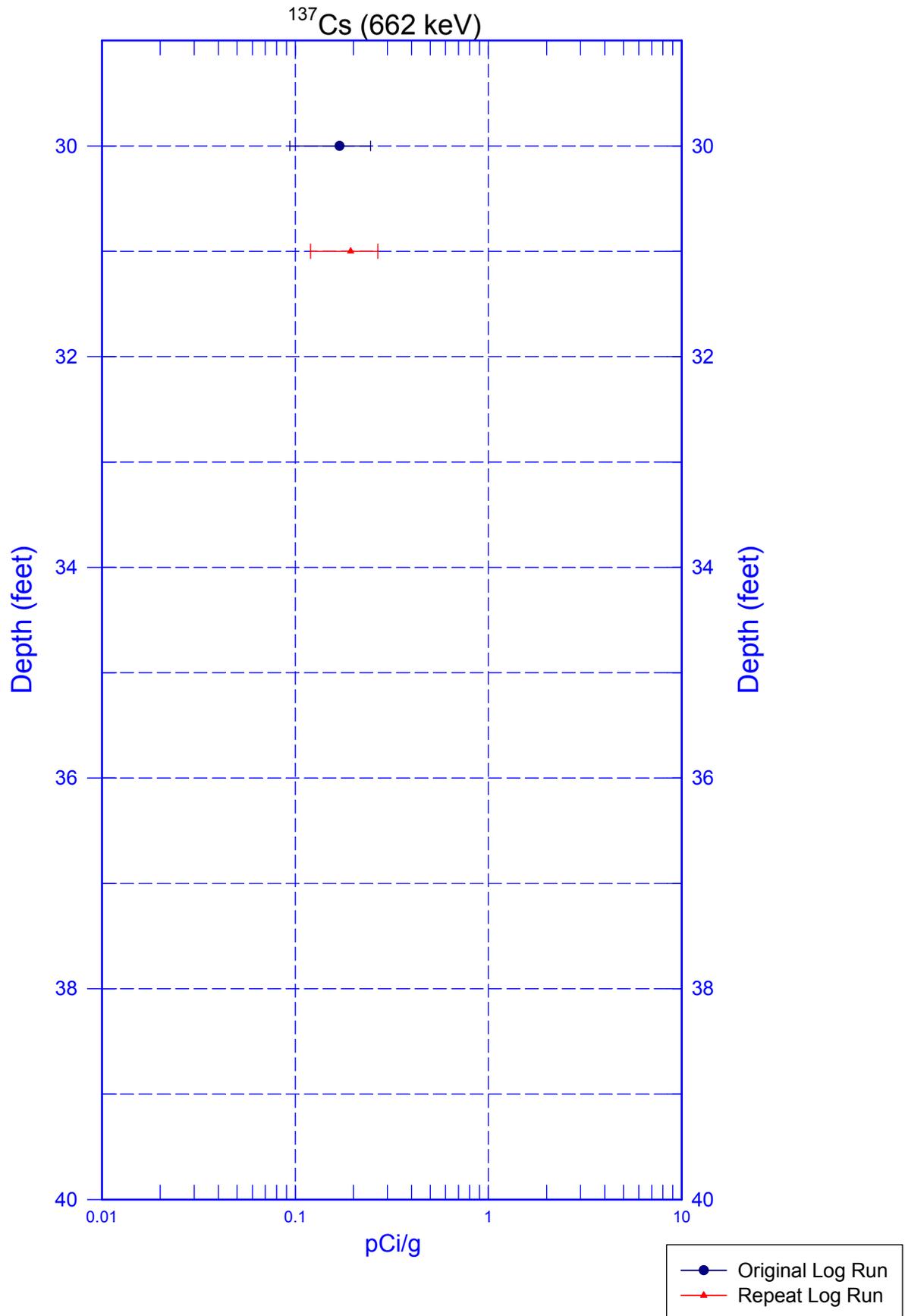
299-W11-57 (A7299)

Rerun of Natural Gamma Logs (40.0 to 29.0 ft)



299-W11-57 (A7299)

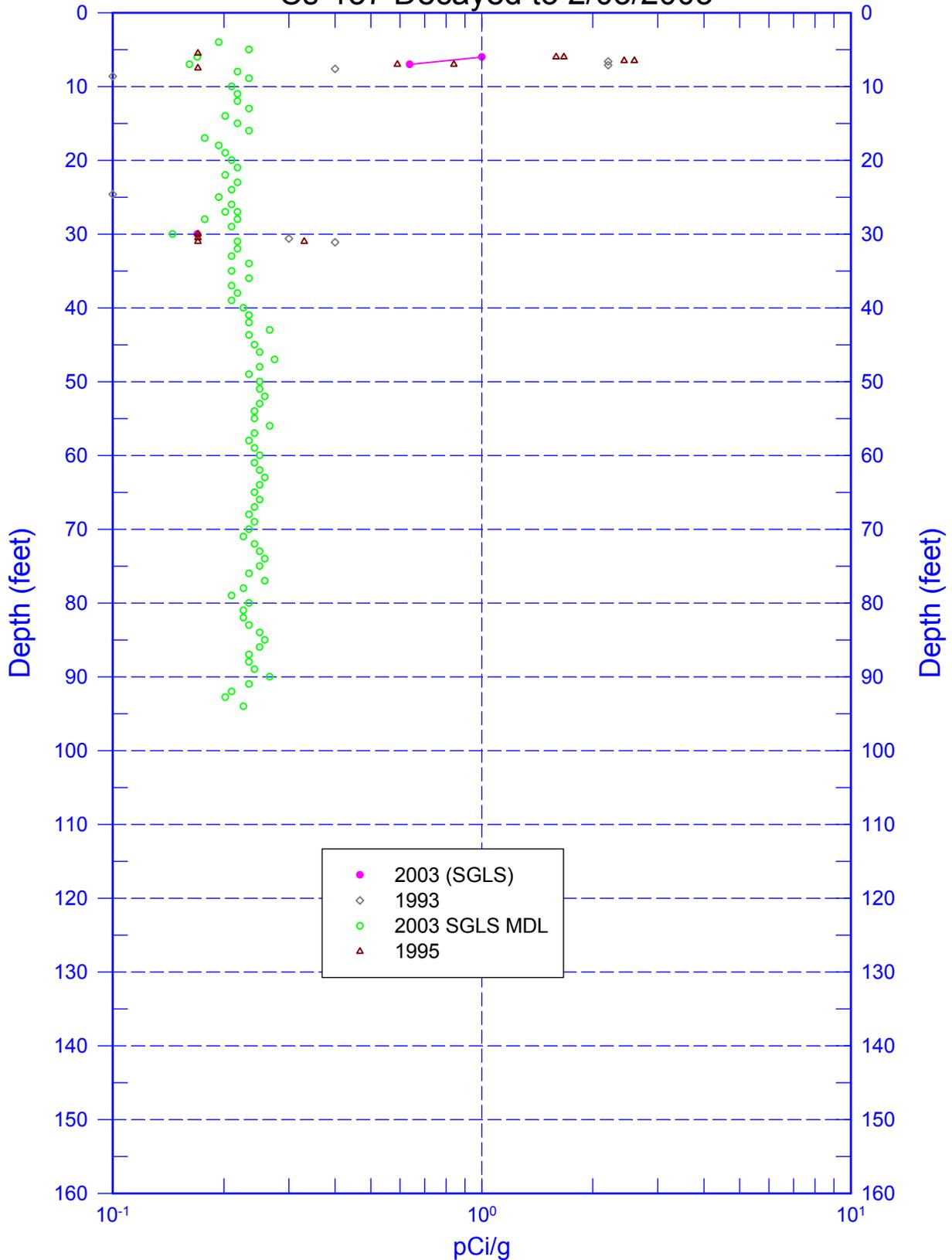
Rerun of Man-Made Radionuclides (40.0 to 29.0 ft)



299-W11-57 (A7299)

RLS Data Compared to SGLS Data

Cs-137 Decayed to 2/03/2003



Zero Reference = Top of Casing (2003 SGLS & 1995 RLS)
1993 RLS Zero Reference = Ground Level